Fundamental Physics for Food Technology and Innovation (4011106)

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Motion in Physics for Food Technology

"*Understanding Motion in Food Processing*"

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Overview of topics to be covered:

A. Introduction to motion
B. Basic concepts
C. One dimensional motion
D. Equations of 1D motion
F. Applications in Food Industry (1D)
G. Two-Dimensional Motion
H. Projectile Motion
I. Circular Motion
J. Real-World Applications
K. Summary

Introduction to Motion

Content:

- *Definition of motion*
- *Importance in food technology*

Figure 1: *Food conveyor belt system*

Basic Concepts

- Title: "Fundamental Parameters"
- Content:
  - *Position (x)*
  - *Time (t)*
  - *Velocity (v)*
  - *Acceleration (a)*

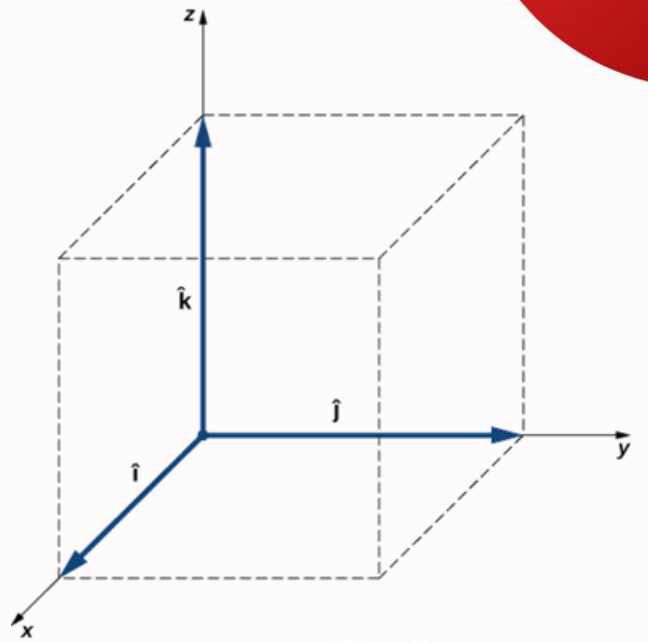

Figure 2: *Coordinate system diagram physics*

One-Dimensional Motion

•Title: "Linear Motion in Food Processing"

•Content:

- *Definition of 1D motion*
- *Examples in food industry:*
  - ✓ *Conveyor belts*
  - ✓ *Liquid flow in pipes*

Figure 3: *Linear conveyor system food industry*

Equations of 1D Motion

- Title: "1D Motion Applications"
- Content:
  - *Continuous flow systems*
  - *Filling operations*
  - *Material transport*

Figure 4: *Bottling line food industry*

Applications in Food Industry (1D)

- Title: "Mathematical Description of Linear Motion"
- Content:
  - $v = v_o + at$
  - $x = x_o + v_o t + \frac{1}{2}at^2$

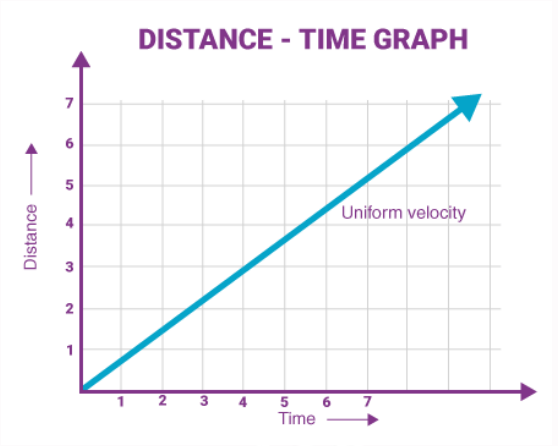

Figure 5: *Distance time graph physics*

Two-Dimensional Motion

- Title: "2D Motion in Food Processing"
- Content:
  - *Definition of 2D motion*
  - *Vector quantities*
  - *Examples in food processing*

Figure 6: *Robotic food sorting system*

Projectile Motion

- Title: "Projectile Motion in Food Operations"
- Content:
  - Horizontal and vertical components
  - Applications:
    - ✓ Sorting systems
    - ✓ Dispensing operations

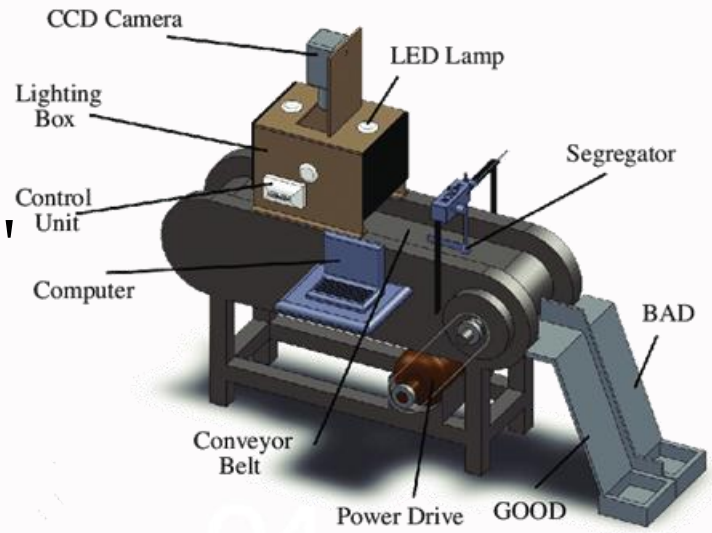

Figure 7: *Food particle trajectory sorting*

Circular Motion

- Title: "Circular Motion in Food Processing"
- Content:
  - Centripetal force
  - Angular velocity
  - Applications:
    - ✓ Centrifuges
    - ✓ Mixing operations

Figure 8: *Industrial food centrifuge system*

Real-World Applications

- Title: "Industrial Applications"
- Content:
  - Case studies:
    - ✓ Mixing systems
    - ✓ Separation processes
    - ✓ Transport systems

Figure 9: *Food processing automation system*

Summary

- Title: "Key Takeaways"
- Content:
  - Relationship between 1D and 2D motion
  - Important equations
  - Industrial applications

Figure 10: *Modern food processing facility*

References.

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